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## Method of Inducing and Maintaining Neuronal Cells

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### *Reference to Related Applications*

5 This application is a continuation of U.S.S.N. 08/835,279, filed April 9, 1997, which is a continuation of U.S.S.N. 08/403,007, filed March 9, 1995, now abandoned, which is a continuation-in-part of U.S.S.N. 08/136,748, filed October 14, 1993, now abandoned. The specifications of which are incorporated by reference herein.

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### *Background of the Invention*

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Understanding the processes that lead from a fertilized egg to the formation of germ layers and subsequently to a body plan is a central goal of embryology. Much of what is known about the development of a vertebrate body plan comes from studies of amphibia where, at the tadpole stage, the main body axis consists of the dorsal structures notochord, spinal cord and somites organized anterior to posterior as head, trunk and tail. All animal tissues derive from the three germ layers and the mesoderm plays a pivotal role in organizing the body axis (Keller, R. in *Methods in Cell Biology*, eds Kay and Peng, Academic Press: San Diego, 1991). Mesodermal cells lead the movements of gastrulation (Keller et al. (1988) *Development* 103:193-210; and Wilson et al. (1989) *Development* 105:155-166), are required for the patterning of the nervous system (Mangold et al. (1933) *Naturwissenschaften* 21:761-766; and Hemmati-Brivanlou et al. (1990) *Science* 250:800-802), and themselves give rise to the muscular, skeletal, circulatory and excretory systems. Moreover, a portion of the dorsal mesoderm from early gastrula, the Spemann organizer, can induce and organize a second body axis following transplantation to another site (Spemann et al. (1924) *Arch mikr Anat EntwMech* 100:599-638).

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The origin of the nervous system in all vertebrates can be traced to the end of gastrulation. At this time, the ectoderm in the dorsal side of the embryo changes its fate from epidermal to neural. The newly formed neuroectoderm thickens to form a flattened structure called the neural plate which is characterized, in some vertebrates, by a central groove (neural groove) and thickened lateral edges (neural folds). At its early stages of differentiation, the

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